1.0 Introduction

This integrated natural resources management plan (INRMP) is the Commander's plan for managing natural resources to support the military mission while protecting and enhancing those resources for multiple use, sustained yield, and biological integrity. The purpose of the INRMP is to ensure the natural resources conservation measures and Army activities on Fort Belvoir's land are integrated and consistent with federal stewardship requirements. This INRMP is written to reflect the scope of Fort Belvoir's stewardship requirements to sustain ecological resources on a landscape and watershed scale. It is also written to be consistent with federal and state laws and regulations; Department of Defense (DoD), Army, and Fort Belvoir policies; and natural resources management philosophies. This INRMP accomplishes the following:

- Summarizes the installation's history and its military mission
- Describes all parties responsible and/or interested in the implementation of the INRMP
- Provides an overview of Fort Belvoir's natural resources program, including a vision and mission statement, as well as overall goals for the natural resources program
- Describes baseline natural resources conditions at Fort Belvoir, as well as current management
- Outlines management objectives and relevant federal and state laws, as well as Fort Belvoir policies for each of the seven major natural resources discipline areas
- Recommends continuing and future management actions for the characterization, preservation, and enhancement of natural resources
- Promotes the use of natural resources in ways that are beneficial to the military mission, natural resources, and installation and public interests, and that are consistent with resource conservation objectives
- Integrates with other installation processes including master planning, cultural resources management, pest management, pollution prevention, etc.
- Addresses implementation by grouping natural resources projects into three main categories (compliance, stewardship, and service), identifying staffing and funding requirements, and scheduling projects for fiscal years (FY) 01 through 06.

Installation and higher command personnel were involved with the development of this INRMP. In addition, Fort Belvoir coordinated with federal, state, and local agencies during the development of this plan. These agencies include DoD, the U.S. Fish and Wildlife Service, the Virginia Department of Game and Inland Fisheries, the Virginia Department of Conservation and Recreation, and Fairfax County.

This INRMP includes 15 sections. Sections 2 through 5 describe the regional setting of Fort Belvoir and existing environmental conditions; discuss the installation history and land acquisition; provide an overview of the military mission, natural resources that are required to support the mission, and potential impacts to natural resources that may result from the mission; include a description of existing and proposed land use and facilities on Fort Belvoir; and discuss parties responsible and/or interested in implementing this INRMP. Section 6 provides an overview of Fort Belvoir's natural resources program, and presents the program's vision and mission statements. Sections 7 through 13 present management objectives, relevant policies, existing natural resources conditions and management, and continuing and future management for the seven natural resources discipline areas including the following:

- Water Resources
- Wetlands
- Undeveloped Areas Vegetation
- Developed Areas Vegetation
- Wildlife
- Rare, Threatened, and Endangered Species
- Special Natural Areas

Section 14 addresses implementation of this INRMP. This section focuses on staffing levels that are required to implement this plan, and thus fulfill the requirements of the Sikes Act, DoD Instruction 4715.3 (*Environmental Conservation Program*), and AR 200-3 (*Natural Resources – Land, Forest, and Wildlife Management*). The section also describes program management functions necessary to execute projects in each of the discipline areas, the funding for complete program implementation, and a schedule of projects by fiscal year. Finally, Section 15 addresses integration of the INRMP with other plans and programs at Fort Belvoir. This section provides recommendations for revisions to these plans during the next update to ensure consistency with this INRMP.

Some of the projects within this INRMP may change through adaptive management, and may be affected by funding availability. Therefore, it is imperative that this INRMP be reviewed annually so that it can be updated for mission or environmental changes. It should also be revised and approved by the command level at least every 5 years.

2.0
U.S. Army Garrison Fort Belvoir

2.1 LOCATION

Fort Belvoir is located in southeastern Fairfax County, Virginia, approximately 18 miles southwest of Washington, D.C., and 95 miles north of Richmond, the Virginia State capital (Figure 2.1). Fort Belvoir's major landholdings are within two separate areas: the 7,678-acre Main Post and the 807-acre Engineering Proving Grounds (EPG). Together with the 581-acre Humphreys Engineer Center and the 28-acre Revana Station, Fort Belvoir has management responsibility for a total of 9,094 acres. U.S. Route 1 bisects Main Post into two distinct geographical areas: North Post and South Post (Figure 2.2). The North Post is bounded by Telegraph Road to the north and northwest; U.S. Route 1 to the south; and Huntley Meadows Park, Woodlawn Plantation, Pole Road Park, and private development to the east. The South Post is bounded by U.S. Route 1 to the north; the Norman M. Cole, Jr., Pollution Control Plant (formerly the Lower Potomac Pollution Control Plant), the Woodrow Wilson Boy Scout Reservation, and private development to the west; Pohick Bay and Gunston Cove to the south; the Potomac River to the southeast; and Dogue Creek, Woodlawn Plantation, and private development to the east. Accotink Village, a 33-acre area along U.S. Route 1, is entirely surrounded by Fort Belvoir, but is not incorporated into the installation's property.

Fort Belvoir owns only land above mean high water. The Commonwealth of Virginia owns land below mean high water with the exception of the Potomac River, which belongs to the State of Maryland.

The EPG is approximately 2 miles northwest of Main Post. It is bounded on the west by Rolling Road, on the east by Backlick Road/U.S. Interstate 95 (I–95), on the south by an industrial park, and on the north by various residential developments (Figure 2.2).

2.2 REGIONAL SETTING

Fort Belvoir is located approximately 75 miles upstream from the Chesapeake Bay along the western shore of the Potomac River, one of the bay's six major tributaries. Many areas in the Chesapeake Bay watershed are experiencing population growth and development pressures. The year 2000 population within the Chesapeake Bay watershed is estimated to be more than 17.5 million (U.S. EPA, 2000b). Since 1983, the Chesapeake Bay watershed has been the focus of an extensive restoration effort that involves the State of Maryland; the Commonwealths of Virginia and Pennsylvania; the District of Columbia; federal agencies, including the Department of Defense (DoD) and the Department of the Army (DA); universities; nonprofit organizations; and the general public.

Fort Belvoir is located in Fairfax County, Virginia, one of the largest regional jurisdictions in the Washington, D.C., metropolitan area, covering almost 400 square miles (Woolpert, 1993a). Because Fairfax County is the location of many bedroom communities for employment centers in the Washington, D.C., metropolitan area, the installation faces environmental problems stemming from the county's rapid growth in residential, industrial, and commercial sectors.

Undeveloped areas on Fort Belvoir are a component of southeastern Fairfax County's open space network, which contributes to the Chesapeake Bay Program's restoration efforts. The Comprehensive Plan for Fairfax County defines open space as any public or private land existing primarily in a natural condition that helps to shape the character, form, and quality of county development. As defined, these areas are used for environmental and heritage resource protection, parks and recreation, agriculture, visual relief, and buffering between adjacent land uses.

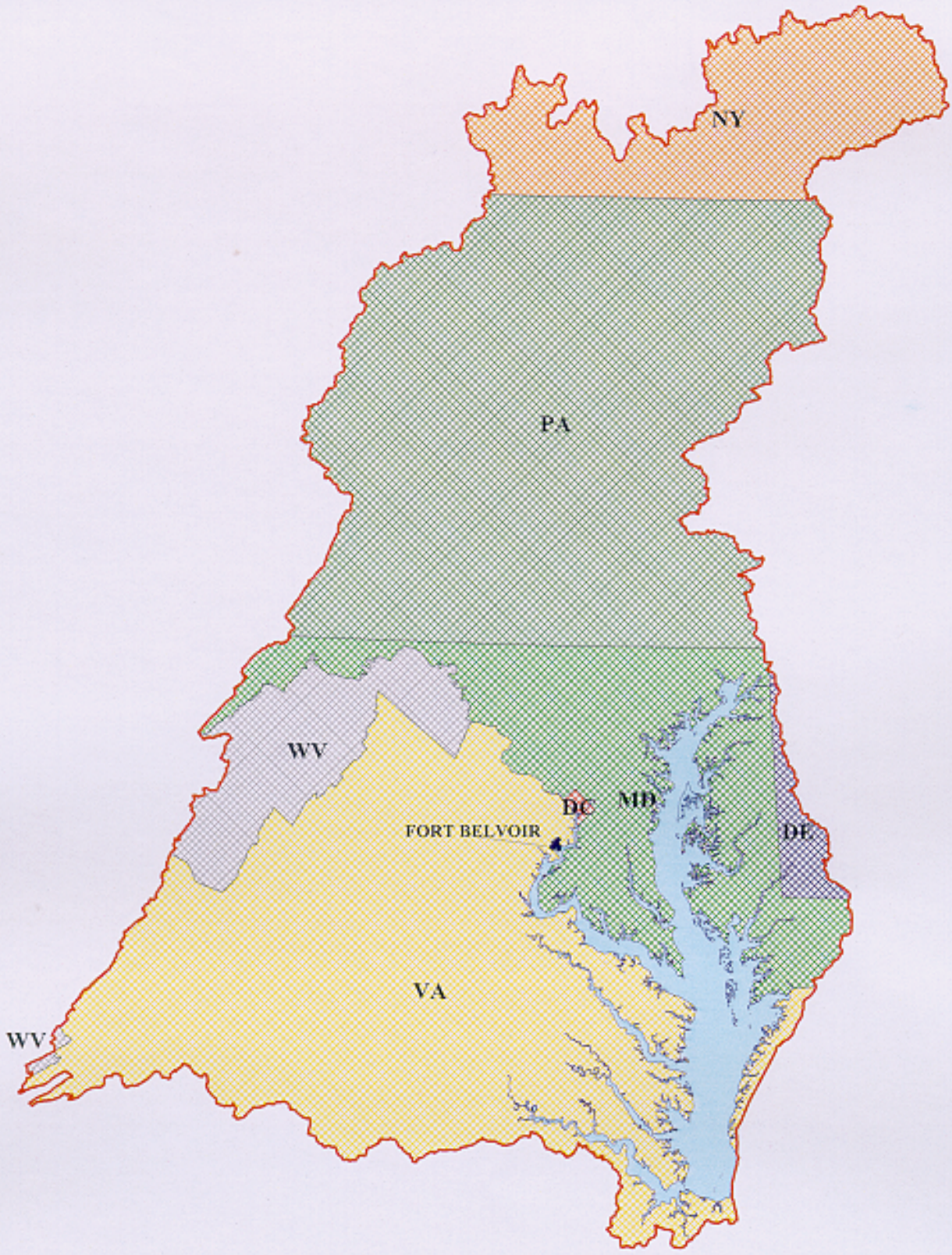
Fort Belvoir's Main Post is located within the county's Lower Potomac Planning District. The Planning District connects Fort Belvoir's open space to other sensitive areas in Fairfax County such as floodplains, stream influence zones, and tidal and non-tidal wetlands associated with major watercourses, including the Potomac River. Significant portions of the Mason Neck peninsula immediately south of Fort Belvoir are held in public ownership, and are managed for the protection of important wildlife habitats and wetlands, with public recreation as a secondary use. The Planning District also includes a number of historic sites and other cultural resources, some of which exist on Fort Belvoir.

According to the Comprehensive Plan, the population of the Lower Potomac Planning District increased from 16,300 in 1980 to 24,371 in 1990 (nearly a 50 percent increase). Between 1990 and 1995, the Lower Potomac Planning District continued to experience growth, with an increase in population to 25,830 (a 6 percent increase). The population of the Springfield Planning District that contains the EPG was 43,240 in 1995, which was an 8 percent increase over the 1990 population (Fairfax County, 1995a).

2.2.1 Topography

The topography of Fort Belvoir's Main Post is characterized by uplands and plateaus, lowlands, and steeply sloped terrain. The land ranges in elevation from approximately sea level along the Potomac River to approximately 230 feet above mean sea level (msl) near the intersection of Beulah Street and Woodlawn Road in the upland area of the installation (Figure 2.2) (U.S. Army, 1989).

The uplands and plateaus make up approximately 40 percent of the installation. Upland areas on the North Post are gently rolling to steeply sloped. Fort Belvoir has two nearly level plateaus that run south-southeast to the Potomac River. The easternmost of the two plateaus is almost a mile wide and extends from Abbott Road southeast to 23rd Street. The western plateau is located in the forested training area south of U.S. Route 1. This plateau is lower in elevation and more gently sloping than the eastern plateau. The highest elevation, approximately 160 feet above msl, is



Chesapeake Bay Drainage Area

Fort Belvoir Area

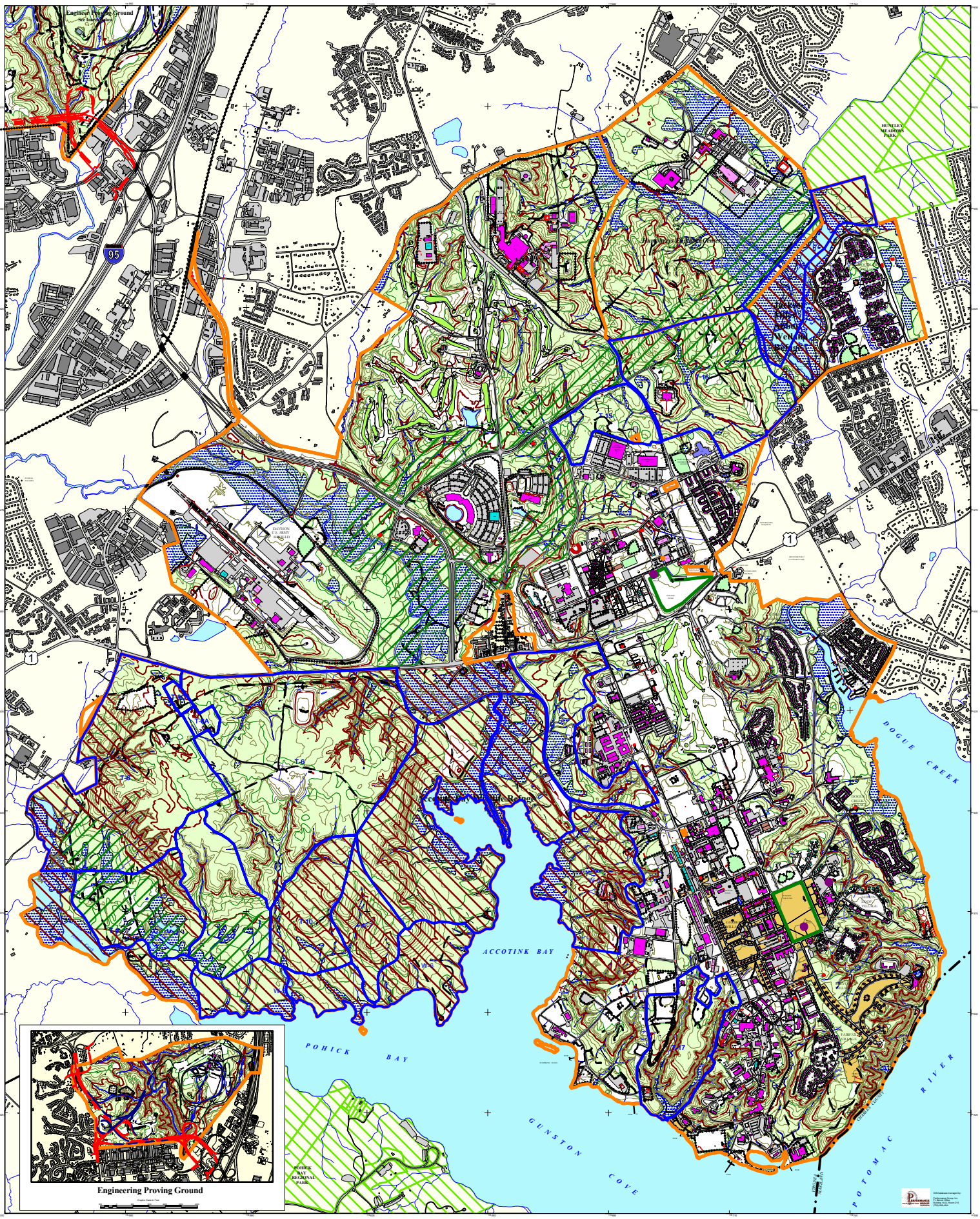
State Boundary

N

GENERAL LOCATION of FORT BELVOIR

SOURCE: U.S. EPA, REGION III
CHESAPEAKE BAY PROGRAM, 2001

FIGURE: 2.1


Engineering Proving Ground
Fort Belvoir Golf Course
HUNTLEY MEADOWS PARK
DAVISON U.S. ARMY AIRFIELD
95
1
DOGUE CREEK
ACCOTINK BAY
POHICK BAY
GUNSTON COVE
POTOMAC RIVER
POHICK BAY REGIONAL PARK
Engineering Proving Ground
Legend
Key Map
General Information
FORT BELVOIR
GENERAL SITE MAP
SOURCE: FORT BELVOIR GIS CENTER, 2000
FIGURE: 2.2

located approximately 3,500 feet south of U.S. Route 1 and the same distance east of Pohick Creek (U.S. Army, 1989).

Lowlands make up about 40 percent of the land at Fort Belvoir. The predominant lowland areas on Fort Belvoir are associated with the floodplains of Accotink Creek, Pohick Creek, and Dogue Creek. Additional lowland areas exist between the shoreline and the steeply sloping terrain that surrounds the two plateaus. The lowland topography is gently sloped. Slopes range from about 10 percent at their upland fringes to almost level along the active floodplains. In the floodplains, numerous relict channels provide local relief of 2 to 10 feet (U.S. Army, 1989).

Steeply sloped terrain is the primary component of the remaining 20 percent of the land at the Main Post. Areas of steeply sloped terrain, ravines, and stream valleys surround the two plateaus on the east, south, and west sides, and separate them from the lowlands. Fringe slopes surrounding the eastern plateau range from 20 to 90 percent. Southeast of 23rd Street, the ground plunges to approximately sea level at slopes that range from 10 percent to almost 90 percent near the Officers' Club and the Belvoir Mansion ruins. A combination of weakly cemented sedimentary substrates and exposure to erosive forces of wind and water near the Potomac River are mainly responsible for unstable steep slope conditions. Steep and highly erodible slopes are also found along the eastern and western edges of the western plateau and in deeply cut stream channels. These slopes range from 10 to 50 percent (U.S. Army, 1989). However, they are likely more stable here than at the southern end of the eastern plateau, since they descend to relatively protected waters or to the gently sloping Accotink Valley and Pohick Valley lowlands. There are many seeps and springs along slope faces.

The elevation at EPG (Figure 2.2) ranges from 100 feet at Accotink Creek to 300 feet in the northwest corner. The topography is gently rolling, bisected by the narrow, steep-sloped streambed of Accotink Creek. Steep slopes also occur along intermittent streams that flow into Accotink Creek. Smaller areas of steep slopes are found along the northern boundary of EPG (U.S. Army, 1992).

2.2.2 Geology and Geomorphology

The following sections provide a detailed description of geology, geomorphology, and groundwater on Fort Belvoir.

2.2.2.1 Geology

Fairfax County is divided into two physiographic provinces: the Coastal Plain and the Piedmont Plateau (Hobson, 1996). The fall line, which runs north to south through Virginia, crossing Fairfax County, forms the boundary between the resistant, metamorphic rocks of the Piedmont and the softer, sedimentary rocks of the Coastal Plain (Figure 2.3) (Godfrey, 1980, as cited in Terwilliger, 1991). These two provinces are subdivided into five sections in Fairfax County from west to east: the Piedmont Lowland, the Piedmont Upland, the mixed Piedmont Upland and high Coastal Plain Terraces, the high Coastal Plain, and the low Coastal Plain Terraces (Hobson, 1996). Most of Fort Belvoir including EPG lies within the high and low Coastal Plain Terraces of the Coastal Plain Physiographic Province. A small area of EPG exists along the eastern edge of the Piedmont Plateau in the mixed Piedmont Upland and high Coastal Plain Terraces. There are several geologic formations associated with the Coastal Plain Physiographic Province including

the Potomac Formation, Bacons Castle Formation, Shirley Formation, and Alluvium and Pliocene sand and gravel (Porter et al., 1963 as cited in Hobson, 1996). The Potomac Formation outcrops along the slopes leading down to the Potomac River shoreline on the Main Post.

The Coastal Plain Physiographic Province consists of unconsolidated sand, silt, and clay underlain by residual soil and weathered crystalline rocks. Most of the Coastal Plain Physiographic Province deposits in the Fort Belvoir area consist of a sequence of unconsolidated sediments that belong to the Potomac Group (Larson and Froelich, 1977, as cited in Law Engineering and Environmental Services, 1995). The Potomac Group is characterized by lens-shaped deposits of interbedded sand, silt, clay, and gravel, primarily of non-marine origin (Force, 1975 as cited in Law Engineering and Environmental Services, 1995). The Potomac Group is approximately 600 feet thick beneath most of Fort Belvoir (Larson and Froelich, 1977, as cited in Law Engineering and Environmental Services, 1995).

The Piedmont Plateau Physiographic Province on Fort Belvoir is characterized by undifferentiated metasedimentary and metaigneous rocks (Mixon et al., 1989, as cited in Hobson, 1996).

2.2.2.2 Geomorphology

Fort Belvoir's uplands are underlain by sands, silts, and clays of riverine origin. Uplands underlain by sands and silts tend to be more stable than those underlain by clays. Uplands that are underlain by clayey soils form undulating and rolling hills and the dominant geomorphic process in these areas is mass wasting which includes downhill creep, landslides, slumping, and rockfalls (excerpted from information in the Fort Belvoir files).

Lowlands and valley bottoms are typically underlain with alluvium. The dominant geomorphic process is active riverine erosion and deposition during overbank flooding. Surface drainage is commonly poor due to the shallow water table.

The dominant geomorphic process in sloping valley sides is characterized by gravitational mass wasting. This includes downhill creep, landslides, slumping, and rockfalls. Drainage usually occurs as surface runoff, with runoff greatest on the steeper slopes and increasing with construction activity and the removal of vegetation, which greatly increases the rate of erosion and the probability of creep and slumping (excerpted from information in the Fort Belvoir files).

2.2.2.3 Groundwater

Fort Belvoir is underlain by three main groundwater aquifers: the lower Potomac, middle Potomac, and Bacons Castle Formation. The lower Potomac aquifer is the primary aquifer in eastern Fairfax County and on the installation. This aquifer exists between a layer of crystalline bedrock and a thick wedge of clay. The clay wedge contains layers of sandy clays, as well as interbedded layers of sand (excerpted from information in the Fort Belvoir files). Water in the lower Potomac aquifer flows to the southeast and is recharged in the western section of Fort Belvoir and to the north and west of the installation (Grogin and Widdowson, 1998). Water from this aquifer below Fort Belvoir is potable. The middle Potomac aquifer consists of inter-fingering lenses of medium sand, silt, and clay of differing thickness. The middle Potomac confining unit is not present in the Fort Belvoir area. Water flow in the middle Potomac aquifer has not been

Virginia Physiographic Provinces

- Appalachian Plateau
- Blue Ridge
- Coastal Plain
- Piedmont Plateau
- Valley and Ridge

N

PHYSIOGRAPHIC PROVINCES of VIRGINIA

SOURCE: FORT BELVOIR GIS CENTER; ESRI USA DATASET; and, WOODWARD, S., 1994

FIGURE: 2.3

well studied (Grogin and Widdowson, 1998). The Bacons Castle Formation is the shallowest aquifer in the North and South Posts. This aquifer's flows are localized, originating from various recharges on the installation and draining to nearby streams, creeks, and large surface water bodies.

Although the water table fluctuates based on precipitation, leakage, and evapotranspiration, depth to the water table at Fort Belvoir is typically 10 to 35 feet below the ground surface. However, in some areas, fine-grained sediment (e.g., clay or fine silt) with low permeability is present in the subsurface, creating isolated local or regional confining layers. These confining layers may locally restrict vertical movement of ground water. The water table may be at or near the surface in areas near streams. Under saturated conditions, artesian wells (in which water rises to the surface) have been encountered at Fort Belvoir (excerpted from information in the Fort Belvoir files). This suggests that shallow groundwater flow closely relates to surface drainage features.

2.2.3 Climate

Virginia's climate is classified as humid subtropical. This means that Virginia is characterized by warm or hot summers and mild winters, and receives sufficient precipitation to support forests. Temperature and precipitation patterns across Virginia vary by topography and distance from the coast (Crokett, 1972, as cited in Terwilliger, 1996). Virginia is located in a zone of prevailing westerly atmospheric motion. Occasional weather systems that move up the coast from the south are responsible for the heaviest storms and more than half the total annual precipitation (Hayden, 1979, as cited in Terwilliger, 1996).

January and February are the coldest months at Fort Belvoir with an average temperature of 34°F, and July is the hottest month with an average temperature of 79°F. Average annual precipitation is 42 inches, and is generally well distributed throughout the year. The Atlantic Ocean and Gulf of Mexico are the principal sources of moisture. Moist, tropical air flows from the southwest in summer and early fall. The frost-free season is 265 days at Fort Belvoir. Snowfall averages 20.6 inches, but rarely stays on the ground for more than a few days (U.S. Air Force, 1998). Temperature and precipitation data for Fort Belvoir are listed in Table 2.1.

Table 2.1. Temperature and Precipitation Data for Fort Belvoir

	Temperature (°F)			*Precipitation*		*Snowfall*
Month	*Maximum Daily*	*Minimum Daily*	*Average Daily*	*Average Monthly (inches)*	*No. of Days With 0.004 Inch or More*	*Average Monthly (inches)*
January	42	28	34	2.9	11	5.8
February	43	30	34	2.9	8	6.7
March	52	37	42	3.8	10	3.6
April	65	49	55	3.2	7	0.1
May	73	54	62	3.8	11	0
June	85	63	73	3.5	8	0
July	89	70	79	3.9	9	0
August	86	67	76	4.2	7	0

Table 2.1. Temperature and Precipitation Data for Fort Belvoir						
	Temperature (°F)			*Precipitation*		*Snowfall*
Month	*Maximum Daily*	*Minimum Daily*	*Average Daily*	*Average Monthly (inches)*	*No. of Days With 0.004 Inch or More*	*Average Monthly (inches)*
(continued)						
September	77	62	69	3.8	10	0
October	67	49	56	3.3	7	0.1
November	55	38	46	3.3	7	0.9
December	48	32	39	3.4	10	3.4
Annual	**65**	**48**	**56**	**42.0**	**105**	**20.6**

Source: U.S. Air Force, 1998

Note: These climate data were obtained from records gathered at the Davison Army Airfield at Fort Belvoir, Virginia. Climate data from 1957 are available on record at the airfield. The data above represent the averages for years 1973 through 1997.

The greatest potential for flooding occurs in late winter and early spring, but storms in the late summer and fall can also cause flooding. Thunderstorms are common in the summer months, occurring an average of 44 days per year at Fort Belvoir (U.S. Air Force, 1998). Hurricanes, which typically affect the weather in the United States during August, September, and October, have the potential to cause destructive high winds, torrential rains, and flooding on Fort Belvoir if they enter Virginia or pass close offshore.

2.2.4 Soils

The Soil Conservation Service (SCS) surveyed the Fort Belvoir Main Post soils in 1982 (U.S. SCS, 1982). The SCS soil survey described and delineated 19 named soil series within Fort Belvoir. Some series occur in more than one phase. The survey data were mapped and have been incorporated into the Fort Belvoir Geographic Information System (GIS). In addition to the 19 named soil series, there are areas of mixed alluvium (Entisols) and tidal marsh (Histosols) that are not sufficiently defined to be classified as series. Of the area included in the survey, 1,898 acres are described as urban built-up and 587 acres are described as cut and fill. The urban built-up unit includes primarily ridge top or other well-drained flatter areas that have been minimally to drastically disturbed by construction and development over the years. Areas within the urban built-up unit that are not under buildings or paving are vegetated and the soil fertility is maintained by amendment. The cut and fill unit is generally of unknown source, but is likely to be material selected for high structural stability following placement. Table 2.2 lists the soils mapped within Fort Belvoir, along with some selected features.

Table 2.2. Fort Belvoir Soils						
Series-Phase	***Taxonomy***	***Drainage Class****	***Flooding***	***Permeability†***	***Erosion Factor‡***	***Acres§***
Appling gritty loam, 2–7% slope	Typic Hapludults	WD	No	MR surface, M subsoil and substratum	4	19
Appling gritty loam, 7–15% slope	Typic Hapludults	WD	No	MR surface, M subsoil and substratum	4	46
Appling gritty loam, 15–25% slope	Typic Hapludults	WD	No	MR surface, M subsoil and substratum	4	12
Beltsville silt loam, 0–7% slope	Typic Fragiudults	MWD	No	S-VS above and below fragipan, VS within fragipan, M-MR in substratum	3	1,114
Beltsville loam, 2–7% slope	Typic Fragiudults	MWD	No	S-VS above and below fragipan, VS within fragipan, M-MR in substratum	3	45
Beltsville silt loam, 7–15% slope	Typic Fragiudults	MWD	No	S-VS above and below fragipan, VS within fragipan, M-MR in substratum	3	4
Bertie silt loam, 0–2% slope	Aquic Hapludults	MWD	No	M	5	99
Chewacla silt loam, 0–2% slope	Fluvaquentic Dystrochrepts	SPD	Frequent (Nov–Apr)	M surface and subsoil	5	58
Dragston fine sandy loam, 0–2% slope	Aeric Ochraquults	SPD	No	MR	4	138
Dumfries sandy loam, 2–7% slope	Typic Hapludults	WD	No	MR, MR subsoil, R substratum	5	18
Dumfries sandy loam, 7–15% slope	Typic Hapludults	WD	No	MR, MR subsoil, R substratum	5	704
Dumfries sandy loam, 15–25% slope	Typic Hapludults	WD	No	MR, MR subsoil, R substratum	5	900
Dumfries sandy loam, 25–50% slope	Typic Hapludults	WD	No	MR, MR subsoil, R substratum	5	573
Fallsington fine sandy loam, 0–2% slope	Typic Ochraquults	PD	No	M	4	44
Galestown loamy fine sand, 0–2% slope	Psammentic Hapludults	SED	No	R, MR subsoil, R substratum	5	37
Glenelg silt loam, 2–7% slope	Typic Hapludults	WD	No	M	3	0.1
Glenelg silt loam, 7–15% slope	Typic Hapludults	WD	No	M	3	14
Keyport silt loam	Aquic Hapludults	MWD	No	MS surface, S subsoil, M substratum	3-2	217
Lenoir silt loam, 0–2% slope	Aquic Paleaquults	SPD	No	VS	5	74
Louisburg coarse sandy loam, 7–25% slope	Ruptic-Ultic Dystrochrepts	SED-WD	No	MR surface & substratum, M-MR subsoil	2	38
Louisburg coarse sandy loam, 25–50% slope	Ruptic-Ultic Dystrochrepts	SED-WD	No	MR surface and substratum, M-MR subsoil	2	82
Lunt fine sandy loam, 2–7% slope	Typic Hapludalfs	WD-MWD	No	M-MR surface, M subsoil, MR-VR substratum	4	125
Lunt fine sandy loam, 7–15% slope	Typic Hapludalfs	WD-MWD	No	M-MR surface, M subsoil, MR-VR substratum	4	93

Table 2.2. Fort Belvoir Soils

Series-Phase	Taxonomy	Drainage Class*	Flooding	Permeability†	Erosion Factor‡	Acres§
(continued)						
Lunt fine sandy loam, 15–25% slope	Typic Hapludalfs	WD-MWD	No	M-MR surface, M subsoil, MR-VR substratum	4	27
Matapeake silt loam, 2–7% slope	Typic Hapludults	WD	No	M surface and subsoil	4	283
Matapeake silt loam, 7–15% slope	Typic Hapludults	WD	No	M surface and subsoil	4	99
Mattapex silt loam, 2–6% slope	Aquic Hapludults	WD	No	M	4	320
Mattapex silt loam, 6–10% slope	Aquic Hapludults	MWD	No	M	4	156
Quantico fine sandy loam, 7–15% slope	Typic Hapludults	WD	No	MR surface, M subsoil, M-MR substratum	4	56
Quantico fine sandy loam, 15–25% slope	Typic Hapludults	WD	No	MR surface, M subsoil, M-MR substratum	4	35
Sassafras fine sandy loam, 2–6% slope	Typic Hapludults	WD	No	M, R substratum	4	117
Sassafras fine sandy loam, 6–10% slope	Typic Hapludults	WD	No	M, R substratum	4	24
Wehadkee silt loam, 0–2% slope	Typic Fluvaquents	PD	Frequent (Nov–Jun)	M	5	132
Woodstown fine sandy loam, 0–2% slope	Aquic Hapludults	MWD	No	M	4	119
Woodstown fine sandy loam, 2–6% slope	Aquic Hapludults	MWD	No	M	4	122
Woodstown fine sandy loam, 6–10% slope	Aquic Hapludults	MWD	No	M	4	17
Mixed alluvial, 0–2% slope	Entisols	PD	Frequent (Jan–Dec)	M	5	604
Tidal marsh	Histosols	VPD	Frequent (Jan–Dec)	M	—	93
Cut and fill	—	—	No	—	—	587
Urban land, 0–10% slope	—	—	No	> 70% impervious	—	1,898

Source: U.S. SCS, 1982.

*Drainage Class Key:

MWD: Moderately well drained
PD: Poorly drained
SED: Somewhat excessively drained
SPD: Somewhat poorly drained
VPD: Very poorly drained
WD: Well drained

†Permeability Key (depth per hour):

VS: Very slow (less than 0.06 inch)
S: Slow (0.06 to 0.2 inch)
MS: Moderately slow (0.2 to 0.6 inch
M: Moderate (0.6 to 2.0 inches)
MR: Moderately rapid (2.0 to 6.0 inches)
R: Rapid (6.0 to 20 inches)
VR: Very rapid (more than 20 inches)

‡Erosion factor given is the "T" factor, representing an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting soil fertility over a sustained period. Rate is in tons per acre per year.

§All acreages are based on the entire Fort Belvoir area as of 1982 and include EPG. Pits and quarries are included in the category of "cut and fill." Swamps are included in the category of "mixed alluvial land."

2.3 FORT BELVOIR SITE HISTORY

According to archeological record, early humans inhabited the Fort Belvoir region since perhaps 11,500 years ago. The first documented inhabitants of the Fort Belvoir region were Native American people, including the first to greet European visitors in the early 1600s. Historical accounts describe Native American villages that once lined the shores of the Potomac River. Villages subsisted on crops such as maize and beans, as well as fish and game taken from the area. Three major groups or tribes existed in the Fort Belvoir area: Patawomeke, Piscataway, and Dogue. Relationships between Native Americans and European colonists were usually friendly in early years, but deteriorated as settlements and land claims expanded (R. Christopher Goodwin and Associates, undated).

Fort Belvoir was in colonial times part of a vast proprietary between the Potomac and Rappahannock Rivers. The proprietary was established in 1649 and known as the Northern Neck. In 1741, Colonel William Fairfax, land agent and cousin of the proprietor, Lord Thomas Fairfax, built a spacious manor house on this estate, which he named "Belvoir." The manor house was destroyed by fire in 1783, and further damaged during the War of 1812. Use of the land for military purposes began in 1915 when the U.S. Army Engineer School began conducting summer training exercises on a 1,500-acre tract of the estate (Woolpert, 1993a).

After the outbreak of World War I, a temporary cantonment area named Camp A.A. Humphreys was constructed on the peninsula between Accotink Bay and Dogue Creek. The Army lands were mostly forest and swamp, with the area surrounding the camp being mostly agrarian. The government acquired an additional 4,800 acres (mainly north of U.S. Route 1) through 1920. At that time, regional transportation systems were improved to accommodate wartime activities at Camp A.A. Humphreys. In order to ensure a drinking water supply to the camp, a dam was constructed in 1918 across Accotink Creek approximately 8 miles upstream of Fort Belvoir's Main Post, creating the current Lake Accotink reservoir near Ravensworth, Virginia. That same year, a water filtration plant was constructed on post (R. Christopher Goodwin & Associates, ND). In 1943, the U.S. Army Corps of Engineers replaced the original Lake Accotink dam (Fairfax County Park Authority, 1998).

Several training schools operated at Camp A.A. Humphreys during World War I. These included the Engineer Replacement and Training Camp; the Engineer Officers' Training Center; the Army Gas School, which provided gas and flamethrower operations training; and the School of Military Mining. Most training was conducted in the area south of U.S. Route 1 between Accotink Bay and Dogue Creek, although parts of the installation east of Accotink Bay were used for rifle ranges (R. Christopher Goodwin & Associates, ND).

At the close of World War I, the U.S. Army Engineer School relocated to Camp A.A. Humphreys, which was designated a permanent post in 1922 and renamed Fort Humphreys. The Engineer School provided training in forestry, road and railroad construction, camouflage, mining, surveying, pontoon bridge construction, photography, printing, and cooking. The site also served as a summer training camp for the Reserve Officers Training Corps (ROTC). The ROTC cadets received basic training in bayonet drill, target practice, military administration and law, first aid and sanitation, bridge building, demolition, reconnaissance, and railroad construction (R. Christopher Goodwin & Associates, ND).

In 1924, the Engineer Board, the forerunner of the Belvoir Research, Development and Engineering Center, relocated to Fort Humphreys. The Engineer Board developed many innovations, including assault boats, portable steel bridges, and mine detectors (R. Christopher Goodwin & Associates, ND).

Many of Fort Belvoir's permanent buildings were constructed between the two World Wars as a result of a nationwide military building program. Most of Fort Humphreys' temporary wood-frame buildings were demolished and replaced by permanent masonry structures. The landscape plan adopted for Fort Humphreys exemplified the Army's efforts at that time to improve the quality of life of its personnel. The plan implemented the philosophies of George B. Ford, planning advisor to the War Department, and of First Lieutenant Howard B. Nurse, Quartermaster Corps officer. The results are still apparent in the configuration of the officer's housing areas (R. Christopher Goodwin & Associates, ND).

In 1935, Fort Humphreys was renamed Fort Belvoir, and it expanded in the 1940s to accommodate increased activity because of the outbreak of World War II. An additional area of 3,000 acres north of U.S. Route 1 was acquired for a new Engineer Replacement Training Center (ERTC) and for new housing. The ERTC schooled troops in reconnaissance, unit coordination, road and obstacle construction, and demolition. Engineering specialists were trained in carpentry, drafting, surveying, and operating construction machinery. Specialized courses were offered in weapons operation such as tanks, flamethrowers, and antiaircraft guns (R. Christopher Goodwin & Associates, ND). Other development north of U.S. Route 1 included construction of the Davison Army Airfield in the western quadrant of the North Post (Figure 2.2).

From World War II to the 1980s, the types of training offered reflected shifts in warfare technology. A close combat range was constructed and a Chemical/Biological/Radiological School started. In the 1950s, the emphasis at Fort Belvoir began shifting from training to research and development. The Engineer Research Laboratories developed and tested new techniques for electrical power generation, camouflage and deception, materiel- and fuel-handling methods, bridging, and mine detection. They experimented with portable copying machines, tropical fungicides, prefabricated buildings, and heavy earth moving equipment. The installation's SM-1 Nuclear Plant became operational in 1957 and was the nation's first national nuclear training facility for military personnel. Additionally, Fort Belvoir provided support to an increasing variety of tenant organizations, including the DeWitt Hospital, the Defense Systems Management College, and the Defense Mapping School (R. Christopher Goodwin & Associates, ND). The 1988 relocation of the Engineer School from Fort Belvoir to Fort Leonard Wood in Missouri completed the shift in Fort Belvoir's function from engineer training to U.S. Army administrative and logistics support.

Fort Belvoir currently provides essential administrative and basic operations support to its tenant organizations. Its location in the national capital region has attracted many tenants from the five military services, as well as many separate DoD agencies.

Relocations to Fort Belvoir include the following:

- U.S. Army Intelligence Security Command headquarters in 1989
- U.S. Army Management Staff College in 1993

- U.S. Army Inspector General School in 1993
- U.S. Army Criminal Investigation Division Command in 1995
- U.S. Army Community and Family Support Center in 1997
- Defense Threat Reduction Agency in 2000.

Fort Belvoir has also become the receiving installation of many organizations realigned by the Base Realignment and Closure Act. For instance, as a result of the closure of the U.S. Army's Cameron Station in 1995, many Defense Logistics Agency (DLA) organizations consolidated functions at the new 806,000-square-foot DLA Headquarters Complex facility at Fort Belvoir. New roads and buildings have been constructed on Fort Belvoir, and existing roads have been improved to accommodate increased numbers of personnel. New community support facilities have been built to provide services to military personnel and dependents in the national capital region. Fort Belvoir is currently estimated to support more than 200,000 military personnel, dependents, and retirees in the region, as well as approximately 4,000 installation dependents and 17,700 military and civilian employees on the installation (Senires-Dubyak, 2000).

2.4 ACQUISITION

Much of Fort Belvoir's current acreage was acquired between 1910 and 1953. Subsequent large changes in land ownership became less frequent as regional development increased. New acquisitions and disposals continue to affect natural resources management decisions on the installation.

The major land acquisitions include the following:

- The U.S. Government acquired 1,500 acres from the Otterback family in 1910. In 1912, this land was transferred to the War Department. At that time, the property consisted of farms, forest, and swamps (R. Christopher Goodwin & Associates, ND).
- Between 1919 and 1920, the installation acquired approximately 4,800 acres. This land consisted of 14 farms, some larger tracts, woods, and a mill (Woolpert, 1993a).
- The installation acquired 3,000 acres north of U.S. Route 1 between 1941 and 1953. This land consisted of small farms and the Woodlawn community's school, church, and Odd Fellows Hall (Woolpert, 1993a).

The major land disposals include the following:

- The installation turned over 243 acres comprising the Accotink Dam and Reservoir area to Fairfax County in 1965 (Woolpert, 1993a).
- In 1981, 581 acres at the northeast corner of the installation (the Humphreys Engineer Center or HEC) was turned over to the Office of the Chief of Engineers (Woolpert,

1993a). Since Fort Belvoir continues to provide installation support and natural resources management for the HEC, it is included in this INRMP (Figure 2.2).

- The General Services Administration sold 107 acres north of U.S. Route 1 between Davison Airfield and State Route 611 in 1986 (Woolpert, 1993a).

In 1988, the Assistant Secretary of the Army for Installation, Logistics, and Environment took control of EPG; however, it remains the property of Fort Belvoir. As of 2000, no final decision has been made to either return EPG to Fort Belvoir's control, or to dispose of or develop this largely unimproved land. Due to its probable change in status, natural resources management actions at EPG have been limited to those actions required by law (e.g., Clean Water Act compliance actions), actions to protect natural resources (e.g., controlled deer hunting, regulatory enforcement), and natural resources studies and surveys to support management decisions (e.g., watershed survey, rare species survey). This INRMP addresses EPG with respect to this type of management emphasis.

The Defense Communications-Electronics Evaluation and Testing Activity (D/CEETA) facility occupies a 262-acre research area in the North Post. An additional 18 acres have been occupied by D/CEETA for the purpose of constructing a small visitor-processing center. Construction of the visitor center and its perimeter fence should be completed in 2001.

2.5 NEIGHBORS

Natural resources management activities at Fort Belvoir may influence adjacent or nearby properties, and activities or conditions at nearby properties, in turn, may influence natural resources at Fort Belvoir. The area surrounding Fort Belvoir is suburban in character, and local land uses outside Main Post are predominantly residential, although industrial developments such as the Newington Industrial Park occur near I-95 and commercial strip developments occur along major roads such as U.S. Route 1.

Many public and private land holdings share boundaries with Fort Belvoir. Some are small, individual properties and are in residential usage. Adjacent holdings include county and state parks, public utility lands, and residential and industrial sites. Along the southern and southeastern boundaries of Main Post are Pohick Bay, Accotink Bay, Gunston Cove, Dogue Creek, and the Potomac River, which are all open waters managed by the Commonwealth of Virginia, the State of Maryland, and the federal government. Accotink Village is another installation neighbor. The unincorporated Accotink Village is entirely surrounded by Fort Belvoir and includes private residential, institutional, and retail land uses. Additionally, there are various owners and operators of roads and utility corridors that border or pass through the installation.

The area surrounding EPG is residential to the north and west. Backlick Road/I–95 touches the eastern boundary, and there is an industrial park along the southern boundary. There is a commercial strip development along Backlick Road.

The region surrounding Fort Belvoir includes a number of sizable tracts in public ownership or conservation management (Table 2.3, Figure 2.4). These include Huntley Meadows Park adjacent

Table 2.3. Major Public Land Owners Near and Adjacent to Fort Belvoir					
Map No. (Fig. 2.4)	***Parcel or Property Name***	***Land Use, Function, or Primary Management Goal***	***Ownership or Managing Agency***	***Approx. miles*/ bearing from Fort Belvoir***	***Area* (approx. acres)***
1	Huntley Meadows	Local passive recreational park and wildlife management area	Fairfax County Park Authority	Adjacent, N 50° E	1,400
2	Pohick Bay Regional Park	Local active and passive recreation	Northern Virginia Park Authority	Adjacent, S 40° W	1,150
3	Norman M. Cole, Jr., Pollution Control Plant†	Wastewater treatment facility	Fairfax County Dept. of Public Works and Environmental Services	Adjacent, S 45° W	120
4	Woodlawn Plantation	National Historic Site	National Trust for Historic Preservation	Adjacent, East	80
5	Pole Road Park	Local active and passive recreation	Fairfax County Park Authority	Adjacent, East	40
6	Grist Mill Park	Active recreation, team sports, and playing fields	Fairfax County Park Authority	0.4, East	95
7	U.S. Coast Guard facilities	Various	U.S. Department of Transportation	0.6, N 35° E	185
8	Gunston Hall Plantation	National Historic Site	Commonwealth of Virginia	1.1, S 35° W	700
9	Mount Vernon	National Historic Site	Ladies of Mount Vernon Association	1.2, N 85° E	525
10	Pohick Creek Stream Valley Parks	Local active and passive recreation	Fairfax County Park Authority	2.1, N 60° W	280
11	Mason Neck State Park	Regional active and passive recreation and wildlife management	Virginia Department of Conservation and Recreation	2.8, S 15° W	1,800
12	George Washington Memorial Parkway	Scenic drive and local active and passive recreation	National Park Service	3.0, East and North	7,200
13	Potomac River National Wildlife Refuge Complex	Wildlife habitat preservation	U.S. Fish and Wildlife Service	3.0, S 30° W	1,050
14	Accotink Stream Valley Park	Local active and passive recreation	Fairfax County Park Authority	3.1, N 20° W	55
15	Piscataway Park	National colonial farm and natural area maintained for views from Mount Vernon	National Park Service	3.8, East	4,050
16	Fort Hunt Park	Local passive recreation	National Park Service	3.8, N 80° E	240
17	Lake Accotink Park	Local active and passive recreation	Fairfax County Park Authority	4.8, N 35° W	950
18	Fort Washington Park	National Historic Site	National Park Service	5.0, East	340

Sources:
- USGS 7.5 minute quadrangles: Fort Belvoir, Virginia – Maryland, 1965; Mount Vernon, Virginia – Maryland, 1966; Occoquan, Virginia, 1966
- Fairfax County Section Maps, Revised 1/12/88
- ADC Northern Virginia Street Map Book, 1996
- Street Atlas USA 4.0 Delorme, 1996

* Distances to land holdings are estimated from the point on the Fort Belvoir boundary nearest the holding to its approximate geographic center. Areas are approximated using rough measurements from the sources listed above. † Formerly the Lower Potomac Pollution Control Plant.

and to the north of Main Post; Woodlawn Plantation and Pole Road Park adjacent and to the east of Main Post; Grist Mill Park, Mount Vernon Estate, George Washington Memorial Highway, and Fort Hunt Park to the east; and Pohick Bay Regional Park, Gunston Hall Plantation, Mason Neck Wildlife Refuge, and Mason Neck State Park to the southwest (Figure 2.4). Across the Potomac River, in Maryland, is Piscataway National Park. These public lands and parks provide more natural habitat for a variety of wildlife. Many of these tracts are especially important because of the conservation of undeveloped riparian areas along the shores of the Potomac River.

2.6 SATELLITE INSTALLATIONS AND SUBINSTALLATIONS

Fort Belvoir maintains three satellite installations totaling 10.7 acres. The three areas are described in Table 2.4. These satellite installations will not be addressed in this INRMP either because of their relatively small acreages, or because of pending changes in ownership.

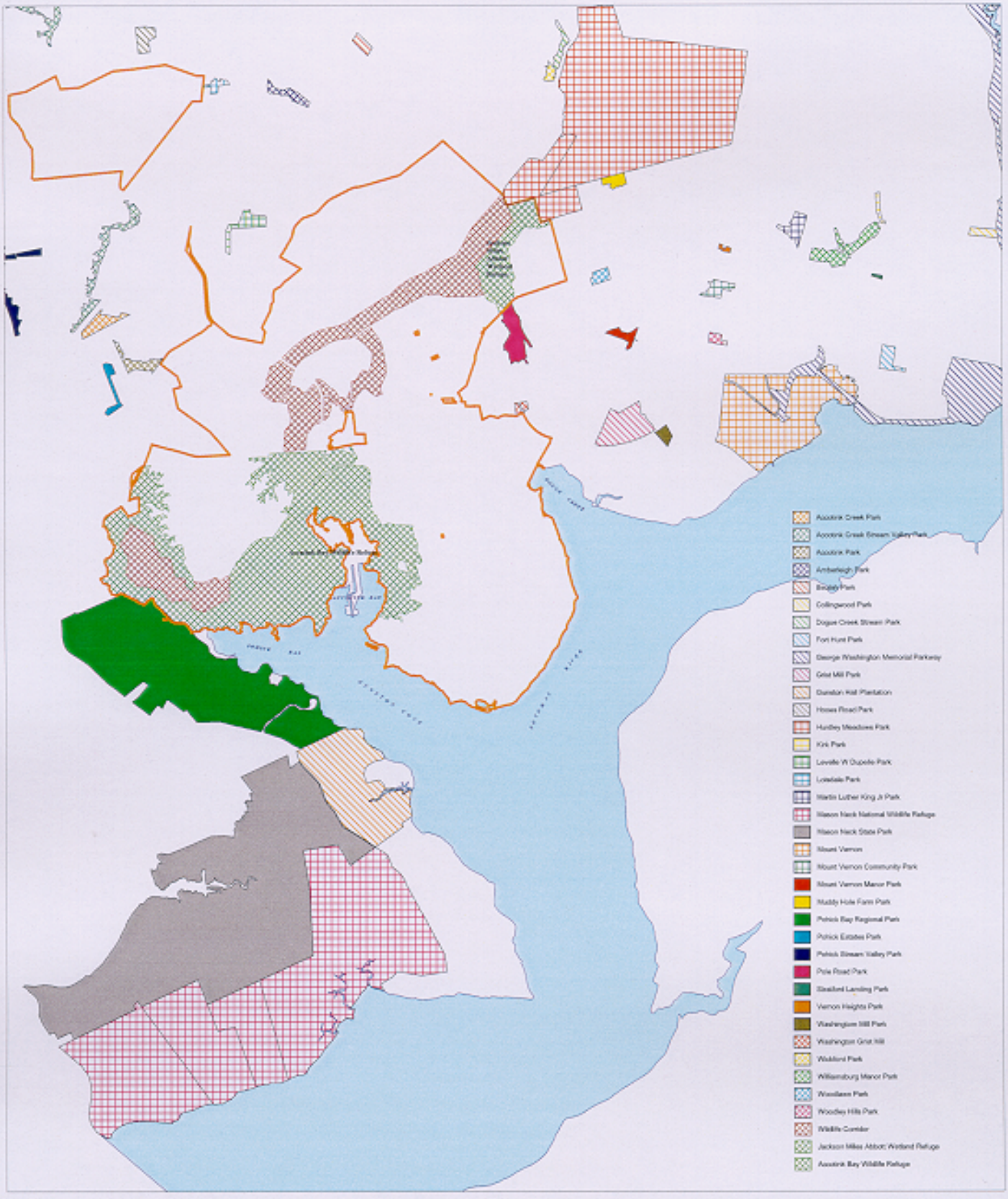
Table 2.4. Fort Belvoir Satellite Installations

Name	*Size (acres)*	*Location*	*Description*
Microwave Station	0.7	Quantico Marine Corps Base in Prince William County, Virginia, approximately 20 miles south of Fort Belvoir	Small microwave station in the process of disposal
Outer Marker	0.5	Charles County, Maryland	Navigational beacon for aircraft approaching and leaving Davison Army Airfield
Revanna Station	8.0	Charlottesville, Virginia	NGIC Building under construction

Source: Groeneveld, 2000.

2.7 JURISDICTION

Fort Belvoir has exclusive jurisdiction over its natural resources. Natural resources law enforcement on the installation can only be performed by enforcement officers with federal commissions. A 1996 Memorandum of Agreement between the U.S. Fish and Wildlife Service and Fort Belvoir delegates to the installation the authority to enforce federal laws dealing with the protection and conservation of fish, wildlife, and natural resources (e.g., Migratory Bird Treaty Act, Endangered Species Act, Marine Mammal Protection Act) (Appendix A).



N

LANDS IN PUBLIC OWNERSHIP

SOURCE: FORT BELVOIR GIS CENTER;
FAIRFAX COUNTY GIS CENTER

FIGURE: 2.4